

# TEXTILE FLAMMABILITY CONFERENCE

October 2-3, 1962

Edited transcript of two-day conference held at Boston, Massachusetts, October 2-3, 1962, under the joint sponsorship of the National Fire Protection Association and the U.S. Public Health Service of the Department of Health, Education and Welfare. The Conference reviewed the effects of textile flammability on the records of fires and fire casualties and discussed possible solutions to the problem. The papers presented and the discussions are summarized here. Transcripts of the meeting are on file at the headquarters offices of the sponsors.

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## TABLE OF CONTENTS

CONFERENCE PARTICIPANTS .....	2
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### INTRODUCTORY REMARKS

Charles S. Morgan, National Fire Protection Association .....	7
Percy Bugbee, National Fire Protection Association .....	7
William V. White, Department of Health, Education, and Welfare .....	8

### THE FLAMMABLE FABRICS PROBLEM

#### A Review of the Problem

Louis Segal, California State Fire Marshal's Office .....	9
---	---

#### Wearing Apparel Fire Record

Chester I. Babcock, National Fire Protection Association .....	10
--	----

#### Fires Involving Nonclothing Fabrics

Rexford Wilson, National Fire Protection Association .....	11
--	----

#### Data on Burn Injuries

Edward S. Sands, Department of Health, Education, and Welfare .....	13
---	----

<u>Discussion Period</u> .....	14
--------------------------------	----

#### Viewpoint of the Cotton Textile Industry

George S. Buck, Jr., National Cotton Council of America .....	15
---	----

#### Viewpoint of the Wool Industry

Herbert J. Wollner, A. C. H. Fiber Service, Inc. ....	16
---	----

<u>Discussion Period</u> .....	17
--------------------------------	----

#### Viewpoint of the American Academy of Pediatrics

Robert H. Trimby, American Academy of Pediatrics .....	17
--	----

<u>Viewpoint of Casualty Insurance Companies</u>	
Charles S. Rust, Aetna Casualty and Surety Company . . . . .	18
<u>Discussion Period</u> . . . . .	19

## ANSWERS TO THE TEXTILE FLAMMABILITY PROBLEM

<u>The Federal Flammable Fabrics Act</u>	
Charles F. Canavan, Federal Trade Commission . . . . .	23
<u>Discussion Period</u> . . . . .	24
<u>NFPA Building Exits Code; NFPA Standard for Flameproofed Textiles</u>	
Robert S. Moulton, Fire Protection Engineering Consultant . . . . .	25
<u>Discussion Period</u> . . . . .	26
<u>NFPA Wearing Apparel Standard</u>	
Louis Segal, California State Fire Marshal's Office . . . . .	27
<u>Discussion Period</u> . . . . .	28
<u>Research at Southern Utilization Research and Development Center</u>	
George L. Drake, Jr., Cotton Finishes Laboratory, U. S. D. A. . . . .	30
<u>Research at Army Quartermaster Research Center</u>	
Thomas D. Miles, Army Quartermaster Research Center . . . . .	32
<u>Research and Application at Lynrus Finishing Company</u>	
Charles F. Russell, Lynrus Finishing Company, Inc. . . . .	34
<u>A Flame-Resistant Synthetic Fiber</u>	
Witt Langstaff, Eastman Chemical Products, Inc. . . . .	35
<u>Discussion Period</u> . . . . .	36

## PUBLIC EDUCATION POSSIBILITIES

<u>What the NFPA Can Do</u>	
Deuel Richardson, National Fire Protection Association . . . . .	41
<u>Opportunities for Public Health Agencies</u>	
Harold W. Demone, Jr., The Medical Foundation, Inc. . . . .	42
<u>Discussion Period</u> . . . . .	44

October 2, 1962

Morning Session

## INTRODUCTORY REMARKS

Charles S. Morgan, Conference Chairman

Assistant General Manager

National Fire Protection Association

The problem under discussion is by no means a new one. The July 1861 issue of Scientific American carried the following statement. "The public has been painfully startled by the death of Henry Wadsworth Longfellow's wife which occurred in Cambridge on the 10th instant. Mrs. Longfellow was seated in her library and was in the act of making seals with sealing wax. A bit of paper caught fire and before the blaze could be contained she was painfully burned. The dresses commonly worn by women in warm weather are composed of muslin and such like flammable materials.

Although we have urged the preparation of ladies' dresses with nonflammable material we trust that the subject of safety clothing will receive more attention from ladies. Their own sense demands this." It will be noted that the writer of this item in Scientific American one hundred years ago recommended the use of nonflammable clothing to prevent such accidents. It will be interesting to see whether this Conference will also suggest reduction in textile flammability as the most practical solution or whether some other answer to the problem now appears to offer a better chance of success.

Percy Bugbee, General Manager

National Fire Protection Association

Early in 1962, Dr. A. L. Chapman, Assistant Surgeon General, and Chief, Division of Accident Prevention of the U. S. Public Health Service, expressed great interest in the subject of textile flammability and a desire of the U. S. Public Health Service to participate jointly with the National Fire Protection Association in a discussion of the subject. Since the NFPA has been working toward solutions to this problem, both through the development of technical fire protection standards and through public education, the Association welcomed the opportunity that would be afforded by this Conference to exchange ideas, describe current efforts to reduce the frequency and severity of fires and fire casualties attributed to combustible textiles, and to explore the possibility of a more effective approach to the problem.

[For the benefit of those at the Conference who had not previously become acquainted with the NFPA, Mr. Bugbee described the history of the NFPA, its purposes, membership, and activities in the field of fire protection and fire prevention. A brochure describing the National Fire Protection Association is available from the Association's executive offices, 60 Battery-march St., Boston 10, Mass.]

A working conference of this sort is completely in accord with NFPA traditions. The Association has long served not only as a worldwide clearing house of information on fire protection and prevention, but also as a meeting place where divergent views on fire problems can be aired, where a better understanding of the needs and objectives of all interested parties can be fostered.

William V. White, Chief

Family Safety Branch, Division of Accident Prevention

Department of Health, Education, and Welfare

When the U. S. Public Health Service was founded in 1798, its first mission was to provide hospital service for merchant seamen. Later activities included quarantine service, communicable disease control, research, mental hygiene, and many others. As scientific methods were applied to disease control, a marked change in morbidity and mortality figures was observed. Today, accidents are the fourth leading cause of death in the United States. Accidents are the first cause of death to persons from age one through age 35—the most productive segment of our population.

The number of fire deaths is exceeded only by the number of deaths from falls and motor vehicle accidents. Nonfatal fire injuries require a staggering amount of medical care and rehabilitation. It is felt that the same scientific principles that were used to reduce the incidence of disease may be used to reduce the incidence of accidental injuries.

Four years ago the Public Health Service, in cooperation with the Arkansas State Health Department, assigned a public health representative to the local health department in Blytheville. He was charged with three assignments: to establish a reporting system from hospitals, clinics, and physicians for fire injuries requiring medical care; to undertake epidemiological investigations of every fire and explosion that occurred in the county; to develop, implement, and evaluate a fire injury prevention program based on these findings. To perform his mission, he first established a good working relationship with the local fire departments, school authorities, and other interested community groups. His activities were not designed to replace any existing efforts by fire authorities in the community but were supplementary to these efforts. The weight of the health department was added to the total push on fire injury prevention.

He established a baseline for fire injuries by developing a basic reporting system. Overloaded electrical wiring and defective equipment were found to be the largest cause of fire incidents. Another cause of many fires was faulty and defective flues. The big offender in terms of fire incidents, injuries, and deaths was the misuse of petroleum products.

Through the application of a saturation-type community education program, the number of fire injuries requiring medical care was reduced by more than fifty per cent. Principal

components of this program are being applied state-wide in Arkansas this year.

A new program to reduce burn injuries, particularly to children, is a special Public Health Service Project in Robeson County, North Carolina. The State Health Officer of Mississippi has requested and been assigned a full-time representative by our Division to develop local health department support for a fire injury reduction program. In the greater Cleveland, Ohio, "Blueprint for Life" program and in our Shenandoah Valley, Virginia, study, the rate of fire injuries was favorably altered by educational methods.

Capitalizing on this experience, we have just signed a letter of agreement with the State Health Officer in Rhode Island to implement a special three-year fire prevention and poison control project.

This year, the Public Health Service produced a series of "Seven Films for Safety." One of these, "Why Daddy?" was produced in cooperation with the National Fire Protection Association.

The sincere interest of the Public Health Service in reducing fire injuries is shown by its joint sponsorship of this Conference on Textile Flammability. The Division of Accident Prevention is not a technical resource on fire prevention. It is seeking information and guidance from the competent authorities represented here today. This information will be used to guide and promote program activities in state and local health departments, to provide subject material for films and exhibits, to stimulate basic research and community demonstration projects. The ultimate goal, of course, is to reduce significantly the number of injuries and deaths due to fire.

Fabrics that will not support combustion, that have a good "hand," that perform well, are attractive and modestly priced, apparently are a future possibility. Various interests are competing to achieve this goal.

How far away is it? Where will the technical answers to the problem be found? Can the fabric be produced by existing mills? How can a demand for the product be created so that volume can be increased and the price correspondingly reduced? What is the timetable for reducing fire injuries by implementing the use of flame-retardant fabrics? These are just a few of the problems to be discussed at this meeting.

# THE FLAMMABLE FABRICS PROBLEM

## A REVIEW OF THE PROBLEM

Louis Segal, Deputy State Fire Marshal

State of California

As Mr. Morgan has indicated, the flammable fabrics problem has a long history. Efforts to control the hazards associated with these materials cover a much shorter period and, in the case of wearing apparel, may be said to have first received widespread attention in 1945. That was when a popular boys' costume—cowboy chaps made from a fabric with a very long pile surface—was sold throughout the country in large numbers. Shortly after these dangerously flammable garments reached the market, reports began to come in of boys who were burned, and in some instances, lost their lives, in fires involving these cowboy chaps. One particular incident in Washington, D. C., in which three boys wearing these costumes burned to death and several others suffered nonfatal injuries, created a great deal of publicity throughout the country. The lawsuits resulting from fires involving this particular item of wearing apparel ran into the millions of dollars—a costly lesson!

In 1951, the so-called torch sweaters created even greater publicity. These were sold all over the country by the millions and, as in the case of the cowboy chaps, consisted of a piled rayon fabric.

It was also in 1951 that the NFPA Committee on Wearing Apparel was organized. Since that time, practically all of the efforts of this committee and of other interested groups have been directed toward development of a standard that, by measuring the relative speed of burning of fabrics, will provide a means of identifying dangerously flammable clothing. Standards have been developed both by the textile industry and by the NFPA; but despite this work, no measurable reduction in the number of wearing apparel fire casualties has resulted. It is obvious that the problem cannot be solved by setting up standards and drawing a line between

"safe" and "dangerous" flammability where it will do any good. Investigations of clothing fires show that almost without exception clothing of ordinary combustibility was involved. If a law were enacted to take this type of clothing off the market, the public would be walking around in rain barrels.

In regard to textiles used for draperies and other decorative purposes, this problem is not so great as in the case of wearing apparel. There is evidence that due to the marvels of chemistry, it will be possible within a few years to eliminate decorative materials, at least in public places, that create any kind of fire hazard. Synthetic fibers are now in existence that are inherently nonflammable and that show promise of satisfying other requirements for decorative fabrics.

In the apparel field, synthetic fibers both solve and create problems. Many synthetics are flame resistant, others are slow burning. Unfortunately, however, some of the synthetics possess the dangerous property of melting when exposed to heat. In a typical wearing apparel fire, ignition of a natural fiber outer garment may cause undergarments of acetate or nylon to melt and greatly aggravate the type and severity of the burn injury. Strangely enough, had the position of the fabrics been reversed, that is, synthetic outer garments and natural undergarments, there might not have been a fire.

One final thought that should be injected into this brief review of the flammable fabric problem is that no fabric, by itself, will ignite, there must be a source of ignition. Thus, an important part of the solution of the wearing apparel fire problem is the elimination of sources of ignition. Many clothing fires are started by unsafe heaters. The use of such heaters should be forbidden by law.

## WEARING APPAREL FIRE RECORD

Chester I. Babcock, Assistant Technical Secretary

National Fire Protection Association

One might hazard a guess—and please don't quote these guesses as NFPA estimates—that about 2,000 people are burned to death annually in wearing apparel fires, and perhaps as many as 300,000 others suffer nonfatal burns. These may be somewhere near the actual figures or as much as 50 per cent off. In any case, the number of wearing apparel fire casualties is much too high and more effort should be made to reduce it.

As undoubtedly will become apparent as this meeting progresses, the answer to the question "What can be done?" is not a simple one. However, two or three specific conclusions that may point to a solution to the problem can be drawn from a recent study of wearing apparel burn cases. The study consisted of an investigation of approximately one hundred wearing apparel burn cases that required hospital treatment, and was undertaken jointly by the Accident Prevention Committee of the American Academy of Pediatrics and the NFPA Wearing Apparel Committee. Obtained in each case were a description of how the accident occurred, an indication of the extent of the injury, and a sample of the clothing that was actually involved.

The objective of the study was to determine whether the textiles involved had any unusual burning characteristics.

If anyone had a preconceived idea that the fabrics were highly flammable, the results were surprising. The study was begun using the Commercial Standard test method—the method now used by the Federal Trade Commission in enforcing the Federal Flammable Fabrics Act. In this method, a sample is suspended at a 45° angle and a small test flame is brought in contact with the sample near its lower edge for one second. Then the time required for the flame to travel five inches is measured. In the first ten tests, using the one-second standard ignition flame exposure, six samples did not ignite, one ignited but immediately went out, and only three ignited and burned. Since this momentary exposure was not sufficient to allow the observation of burning characteristics, the exposure period was adjusted. In the remaining tests, exposure of the sample to the test flame was sustained until ignition occurred. The exposure periods required for ignition ranged from 2 1/2 to 5 seconds.

In the Commercial Standard method of testing, a fabric is said to have normal flammability if a flame takes more than 3 1/2 seconds to travel 5 inches along a sample. In the first ten samples tested according to the revised method (i.e., the test flame was held

against the sample near the lower end until the sample ignited), it took from 18 to 74 seconds for the flame to travel the five inches. Certainly, these samples could not be classified as dangerously flammable by any reasonable standard. The ten fabrics tested were cotton knits, cotton flannels, twills, corduroys, and mixtures of nylon and cotton, and were typical of the fabrics involved in the other cases studied. These fabrics did not burn with great speed, yet they sent ten people to hospitals for treatment of burns.

In not one instance did a fabric burn so fast as to be classified as dangerously flammable. In fact, 109 of the 120 different clothing samples tested did not ignite with the one-second flame exposure test. A proper conclusion, therefore, from these tests is that fabrics which cannot be classified as dangerously flammable by any stretch of the imagination are responsible for most burn casualties.

So much for the principal objective—determining the flammability of fabrics involved in actual burn cases. There were some other results of this study that should be mentioned.

How did these fires start? The most frequent ignition source was the gas stove. Victims of fires from this source were boys and girls standing with their backs to the stove with their shirt tails out, women working around stoves with kimono-type sleeves, and children playing around stoves. Electric stoves were also a common ignition source with ignitions occurring in much the same fashion as with gas stoves. Clothing ignitions from children's playing with matches or cigarette lighters were also frequent. Smoking in bed was another way in which clothing became ignited. Practically any ignition source imaginable was represented—a child's sleeping attire was ignited when she stood with her back to a fireplace; fuel oil that spilled on a man's shirt ignited while an oil stove was being filled.

There is nothing mysterious about the cause of any of these wearing apparel fires. They were due to carelessness or to a lack of awareness that a hazard existed. So, another conclusion from these tests is that carelessness on somebody's part or, in some cases, ignorance of the hazard, was a factor in just about every instance. Two exceptions were women who tried to commit suicide by igniting their clothing.

A third conclusion from these case histories is that the design of the garment sometimes is directly responsible for the ignition. The loose-sleeved housecoat above the stove, the full skirt, loose-fitting blouses—these are often involved in wearing apparel fires.

Finally, there is the age of the victims. It has long been known that children and elderly people account for more than half the fire casualties. The same was true in this sampling of wearing apparel burn cases. Children ten years of age and under accounted for 43 per cent, and people over 65, for 10 per cent.

To summarize, four logical conclusions can

be reached from a study of these incidents: 1. the textiles involved cannot be classified as dangerously flammable; 2. the causes of these fires reflect great carelessness or lack of awareness of the possibility of clothing ignitions; 3. the design of garments is a factor in some fires; 4. children seem particularly prone to ignite their clothing accidentally.

## FIRES INVOLVING NONCLOTHING FABRICS

Rexford Wilson, Fire Record Editor

National Fire Protection Association

There are two basic ways in which textiles are used in buildings—as hanging textiles and as coverings for furnishings and floors. Fire experience has shown that presently-used textile floor coverings do not affect to a significant degree, fire severity in buildings. On the other hand, hanging fabrics and coverings for furniture do have a marked effect on building fires.

Hanging textiles, i.e., curtains, tapestries, cubicle curtains in hospitals, wall coverings, can greatly increase the initial rate of fire spread. Large cloth panels, often with both surfaces exposed to air, can create a very rapidly spreading fire. Burning hanging textiles often generate intense heat that is sufficient to ignite other combustibles. The panic that is apt to result at the sight of a rapidly spreading sizeable flame is another hazard of hanging fabrics.

The following brief summaries of actual fires illustrate how hanging fabrics affect fire behavior in buildings.

A furniture store installed new floor-length draperies in one of its show-window displays. Unknown to a workman, his ladder had damaged the cord to a bedside table lamp in the display. The workman finished and left. At 7:00 p.m., an automatic timer turned on the display lighting. The cord short circuited and sparks ignited the drapery nearby. As a salesman in the nearly empty store grabbed a portable extinguisher and ran toward the show window, flames burst up the curtain, driving him back. The flames from the curtain ignited the combustible acoustical tile ceiling and spread rapidly across the first floor of the store.

Two vigil candles flickered on the altar of this unoccupied church building. The fabric hanging on the wall behind

them ignited. Flames spread up the fabric surface, igniting other combustibles nearby. The fire was discovered shortly thereafter, but had made such headway that the church was completely destroyed.

In preparation for a dinner, draperies had been hung from the 25-foot-high balcony in the gymnasium of an athletic club. The draperies, 18 inches out from the wall, covered the entire 50 ft. by 90 ft. room, from the balcony to just above the floor, except for the doors. The gym was located on the second floor of a five-story building. Beside the gym an open stairwell led to the top floor.

As workmen were completing the last of the decorating, spotlight placement, and sound installation, a short circuit in temporary wiring ignited one corner of one curtain. One workman ran down the stairs and rang the building's fire alarm system. The other men looked around for extinguishers, which were hidden from view by the curtains. Fire spread across the surface of those curtains so quickly that they were forced to flee for their lives.

Smoke and heat poured up the open stairwell. Three building occupants raced for their rooms to get valuables. A maid fled upward to the fifth floor and in panic, sought shelter from the thickening smoke in a linen closet. Others ran into the adjoining building which was cut off from the involved structure by a masonry wall and fire doors. Smoke grew so thick in the adjoining building that several men were forced to climb down an outside drain pipe. In the building of origin, the three men in their rooms, and the maid in the closet, were asphyxiated. Sixteen other persons were seriously injured.



In the Melody Lounge in the basement of the Cocoanut Grove Night Club, combustible fabric and decorations covered the walls and ceiling. Most exit doors were locked or barred. For the staff it was a night like 5,000 other nights until just after 10:15 p.m. Combustible artificial palms in the basement Melody Lounge were ignited, possibly by a match flame, and flames ignited the fabric ceiling. As the fire raced across the fabric ceiling, a puff of heat surged up the stairway. The crowd of 1,000 in the club pushed for the exits. Like meat in a grinder, half were squeezed or pushed, or groped their way out alive. About 200 of the 492 who lost their lives in the fire piled up behind a revolving door. Another 100 piled up against a door swinging against the route of exit travel.

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The fire behavior of fabric used as covering is quite different from that of hanging fabric. Fabric used as a covering is often horizontally positioned, near the floor. When it comes in contact with a cigarette, sparks from an electrical short circuit, carelessly dropped match, or some other ignition source, a smoldering-type fire is apt to be the result. Such fires generate their heat over a long period of time. Thus, the heat dissipation from the material to the room and from the room to the outside is very good, and the rate of temperature rise within the area can be extremely low, perhaps as low as five or ten degrees over a two- or three-hour period. While this smoldering fire does not generate much heat, it does consume oxygen from the surrounding atmosphere; it does generate copious quantities of noxious smoke and toxic gases. The combination of the reduced oxygen level and the toxicity of the products of combustion has been the cause of a great many fatal fires in homes.

Here are a few reports of fires involving fabric covering material.

From the evidence at hand, fire fighters were able to reconstruct the probable sequence of events which led to this tragedy. The husband was away from the house on duty as an intern at a local clinic. His wife was last seen, by a neighbor, working in the laundry room in the basement shortly before midnight.

Between that time and time to give the baby its 2 a.m. feeding, she sat on the sofa in the living room, smoking and possibly watching television. While there, a spark or a lighted cigarette fell on the sofa unnoticed. She gave the baby its regular feeding, left him sleeping in his carriage in the living room, and retired.

The smoldering fire developed in the sofa, eventually burning through and causing burning embers to fall on the rug beneath the sofa. The lethargic burning continued until the fire had slowly eaten its way through the floor and into the baseboard at the wall behind the sofa. Heat and smoke spread throughout the entire house.

Sometime between four and five o'clock, the mother of the three small boys awakened in the oxygen-starved house. She struggled out of bed, knocking over a lamp on a bed table as she attempted to get her bearings in the thick smoke. She succeeded only in getting the telephone off its cradle before losing consciousness. Apparently, the five-year-old boy awakened moments later and went to his mother's bedroom where he, too, collapsed. The 2 1/2-year-old's body was found in his crib in the bedroom from which his brother had come, and the baby's body was in the carriage in the living room downstairs.

Shortly before 6 a.m. a neighbor noticed smoke coming from the dwelling and telephoned the fire department. Upon arrival, firemen found the house completely charged with heavy smoke and heat. They were repeatedly driven back in their attempts to gain entry until windows were broken to provide ventilation. Although the entire interior of the house was blackened from smoke and the coroner set the time of death at one to two hours before the alarm, the actual fire was confined to a small area around the sofa in the living room and the basement ceiling.

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A resident's smoking in bed was reportedly the cause of a ninth-floor fire in a 500-room fire-resistive hotel. A woman in the apartment directly above the room of origin smelled smoke, and called the manager who activated the alarm system. The system rang bells on each floor and transmitted an alarm directly to the fire department. Approximately 400 guests began escaping safely, both by stairways and elevators. Fire fighters climbed to the eighth floor, attached to the standpipe there, and proceeded to the ninth floor. On opening the fire door to the ninth-story hall, they were greeted by a blast of hot gas which fatally burned one of them.

Two guests in a ninth-floor room were asphyxiated and the resident of the room of origin died though he was alive when rescued.

A 50-year-old woman patient received fatal burns at a hospital when she attempted to smoke a cigarette in an oxygen tent. She obtained the smoking materials from her handbag on the bedside table. On noticing smoke coming from the room, a nurse looked in and saw the fire. She notified the switchboard operator, shut off the oxygen, and smothered the fire with blankets. The sheets and blankets on the bed were destroyed.

In summary, textiles used in buildings can be generally classified either as hanging textiles or as covering textiles. Both uses of textiles present, in general, different but equally hazardous conditions: one of extremely rapid, panic-creating fire spread, the other, of extremely slow, oxygen-robbing, gas-generating fire spread. Both conditions can lead and have led to severe loss of life.

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## DATA ON BURN INJURIES

Edward S. Sands, Assistant Chief

Family Safety Branch, Division of Accident Prevention

U. S. Public Health Service

Burn injuries represent a problem, not only to those in the field of safety and accident prevention, to the medical profession, and to the casualty insurance industry, but to all people.

In one decade (1940-1949), according to proceedings at the First International Congress on Burns, held in Washington, D. C., in 1960, 80,000 people died from burns in the United States and \$625 million was spent for the hospitalization of burn victims.

Data from the U. S. National Health Survey indicate that in the year ended June 1959, there were 1,878,000 burn injuries, 929,000 of which occurred in the home. These were serious enough to be medically attended or to cause at least one full day of restricted activity. In the year 1959, there were 70,000 who required hospitalization.

Fire and explosion is one of the most common fatal accidents among children and the elderly. Children under 15 years of age (31 per cent of the population) experience 29 per cent of the deaths from fire and explosion; persons over 65 (9 per cent of the population) experience 28 per cent of deaths from fire and explosion; accidents in the home are responsible for more than three-fourths of all deaths from fire and explosion.

About 13 per cent of deaths, according to a study of Metropolitan Life Insurance Company claims records of policy holders, was attributable to clothing's being ignited while a person was working at a stove, or standing or walking near a fire. (Stat. Bull., Oct. 1960, Met. Life Ins. Co.)

Twelve cases of accidental burns to children, caused by fire and explosion, have been investigated in St. Louis as part of an over-all accident prevention program in 1961. In seven of the twelve cases, the clothing of the children caught fire and either caused the in-

jury, or increased the severity of the injury.

Reporting on causes of burns among 77 patients, Griswold has noted that 13 per cent were caused by smoking in bed or chairs. He states in his paper ("Treatment of Burn Cases," Martin L. Griswold, Jr., M.D., J.A.M.A., Vol. 164, No. 8), "It is doubtful if much attention is paid to the flammability of fabrics when they are purchased by the average housewife. I recently discussed the problem with the head of a large textile company, and the fact was brought out that there is very little demand for fire-resistant fabrics and that much more could be done in the way of coating fabrics to reduce the spread of the flame. Some children's costumes have been banned after the children have been burned, thus bringing the matter to the attention of the lawmakers. These accidents have usually happened because there have been open candles at parties. Untreated cotton is one of our most highly flammable fabrics and is the material used almost universally in such common articles as bedsheets and shirts.

"In general, flame will travel rapidly from the point of ignition on any cotton or linen fabric. Wool, nylon, and Orlon will only burn at the point of contact and are, therefore, quite fire resistant. Silk and rayon are less vulnerable to fast burning than is cotton or linen. We are certainly not going to exist without using fire, and the above discussion suggests one avenue that we can pursue to reduce the destruction."

Investigation of thirty home accidental deaths due to fire and explosion over a four-year period, 1954-58, in Colorado, in age group 65 and over, revealed that 23 per cent involved ignition of clothing; 17 per cent involved falling asleep in bed or in a chair while smoking.

In a paper prepared by Leonard Colebrook and published in the Bulletin of the New York

Academy of Medicine, July 1951, the author writes, "From all these sources I have gained the impression that the factors responsible for domestic burns in the United States vary somewhat widely in the different regions. Thus, in New York I was told that many serious burns were due to the ignition of clothing by gas cooking stoves. In other cities, where natural gas is not available, I gather that the same accident is more often due to mishaps with kerosene stoves.

"By and large, however, it appears that the problem is similar in our two countries. Flame, in one form or another, is the immediate existing cause of the most severe burns. In the series of 1,000 consecutive burns and scalds reported by Hoffman from Chicago, no less than 379 burns were attributed to flame. And of the 568 fatal burns and scalds analyzed by the Tennessee Department of Health (1939-43) no less than 292 were traced to an "open grate" or a stove.

"Summarizing the information I have obtained, the predominant causes of burns in the United States appear to be: gas and kerosene stoves, and open grates burning wood or coal; careless use of kerosene for lighting or reviving fires; careless use of flammable liquids, e.g., for cleaning clothes; matches and cigarettes, especially in bed; firecrackers; fireworks, and trash fires; hot fat and hot metals; chemicals; electrical burns.

"In the first four categories, the actual injury was usually caused by the ignition of clothing."

Hospital admissions for accidental burn injuries at a hospital in a southern rural county, for the period 1957-1961, show that 44 cases of

118 involved clothing's coming in contact with fire. Almost all cases involved young children or elderly people.

At a hospital in a southern city, a total of 457 children, ranging in age from 6 months to 16 years, were seen during the period 1921-1953 for treatment of full-thickness burns. Of these victims the 414 admitted for treatment accounted for a staggering total of 90,992 days at a cost of \$545,942. The cause of burns in 46 per cent of the cases was ignition of clothing.

It would appear that burn injuries in which the ignition of clothing or bedclothes was a factor represent a significant part of both the burn injury problem and the total fire prevention problem.

To me, a burn injury represents one of the most painful and destructive types of injuries, which is good reason for taking constructive and practical action to correct the problem.

The Public Health Service is concerned with burn injuries and deaths for still other reasons. Besides being concerned with improving the health of the people and maintaining good health, it is concerned with reducing the cost of medical care, the cost of time lost, over-all costs which result from fire. Fires and burn injuries involving ignition of fabrics represent a specific aspect of the total problem. A significant breakthrough concerning this aspect would be most meaningful.

Action that is taken must be multilateral and have the cooperation of all parties—members of the business community, private agencies, and government—to be successful.

## DISCUSSION PERIOD

Mr. Louis Segal: I would like to correct Dr. Griswold's statement as quoted by Mr. Sands, to the effect that rayon is less flammable than cotton. This is not true; rayon is as flammable as cotton.

Mr. Hans Grigo: What is a full-thickness burn?

Dr. Robert H. Kennedy: There are three types of burns: One, known as a first degree burn, is simply a reddening or possibly a blistering of the skin; one removes part of the skin's thickness and is known as a second degree burn; one, known as a third degree burn, destroys all skin in some parts and everything may burn, even down to the bone.

(Dr. Robert Trimby distributed photographs of patients with third degree burns.)

Dr. George M. Wheatley: The attendance here is an indication of how delighted we are at the leadership which the NFPA and the Public

Health Service have taken in this problem. Some of us have been interested in it for many years and think this is a high water mark in this whole effort. We are looking forward to the outcome of this discussion.

Mr. Louis Segal: People continually come to my office to relate burn experiences. More often than not, they are attorneys who are considering filing suit for a client. Almost invariably the reaction of either the victim or a witness is that the article involved was practically explosive. From my own experience, I doubt that this is true. In all likelihood the garment was completely normal as far as flammability is concerned. Tests have confirmed this opinion. The public is so totally unaware of how fabrics burn that when something ignites, the fire is erroneously described as "explosive." Very often the newspapers use the words "extremely flammable, unbelievable, explosive." Take this with a grain of salt.

Academy of Medicine, July 1951, the author writes, "From all these sources I have gained the impression that the factors responsible for domestic burns in the United States vary somewhat widely in the different regions. Thus, in New York I was told that many serious burns were due to the ignition of clothing by gas cooking stoves. In other cities, where natural gas is not available, I gather that the same accident is more often due to mishaps with kerosene stoves.

"By and large, however, it appears that the problem is similar in our two countries. Flame, in one form or another, is the immediate existing cause of the most severe burns. In the series of 1,000 consecutive burns and scalds reported by Hoffman from Chicago, no less than 379 burns were attributed to flame. And of the 568 fatal burns and scalds analyzed by the Tennessee Department of Health (1939-43) no less than 292 were traced to an "open grate" or a stove.

"Summarizing the information I have obtained, the predominant causes of burns in the United States appear to be: gas and kerosene stoves, and open grates burning wood or coal; careless use of kerosene for lighting or reviving fires; careless use of flammable liquids, e.g., for cleaning clothes; matches and cigarettes, especially in bed; firecrackers; fireworks, and trash fires; hot fat and hot metals; chemicals; electrical burns.

"In the first four categories, the actual injury was usually caused by the ignition of clothing."

Hospital admissions for accidental burn injuries at a hospital in a southern rural county, for the period 1957-1961, show that 44 cases of

118 involved clothing's coming in contact with fire. Almost all cases involved young children or elderly people.

At a hospital in a southern city, a total of 457 children, ranging in age from 6 months to 16 years, were seen during the period 1921-1953 for treatment of full-thickness burns. Of these victims the 414 admitted for treatment accounted for a staggering total of 90,992 days at a cost of \$545,942. The cause of burns in 46 per cent of the cases was ignition of clothing.

It would appear that burn injuries in which the ignition of clothing or bedclothes was a factor represent a significant part of both the burn injury problem and the total fire prevention problem.

To me, a burn injury represents one of the most painful and destructive types of injuries, which is good reason for taking constructive and practical action to correct the problem.

The Public Health Service is concerned with burn injuries and deaths for still other reasons. Besides being concerned with improving the health of the people and maintaining good health, it is concerned with reducing the cost of medical care, the cost of time lost, over-all costs which result from fire. Fires and burn injuries involving ignition of fabrics represent a specific aspect of the total problem. A significant breakthrough concerning this aspect would be most meaningful.

Action that is taken must be multilateral and have the cooperation of all parties—members of the business community, private agencies, and government—to be successful.

## DISCUSSION PERIOD

Mr. Louis Segal: I would like to correct Dr. Griswold's statement as quoted by Mr. Sands, to the effect that rayon is less flammable than cotton. This is not true; rayon is as flammable as cotton.

Mr. Hans Grigo: What is a full-thickness burn?

Dr. Robert H. Kennedy: There are three types of burns: One, known as a first degree burn, is simply a reddening or possibly a blistering of the skin; one removes part of the skin's thickness and is known as a second degree burn; one, known as a third degree burn, destroys all skin in some parts and everything may burn, even down to the bone.

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## VIEWPOINT OF THE COTTON TEXTILE INDUSTRY

George S. Buck, Jr.,

Assistant to the Executive Vice-President

National Cotton Council of America

The Cotton Council is a central organization of the cotton industry, representing producers or growers and the intermediate groups of ginner, warehousemen, seed crushers, raw cotton merchants and spinners or mills. The Council has a staff of about 175 with offices in Memphis, Washington, New York, Paris, and Brussels.

The cotton industry is greatly interested in textile flammability since cotton is involved in a good many burn casualty cases. There are two reasons for this involvement. First, like many fibers, cotton is not only combustible but can be manufactured in relatively thin and flexible forms which lend themselves to ignition. Second, cotton is still the most widely used textile fiber and far exceeds all others combined in volume of consumption. Cotton has many uses as hanging or covering materials, as well as clothing. The cotton industry's concern with textile combustibility is long established. When I started in the industry as a chemical engineer twenty-seven years ago, there was interest in making fire-resistant fabrics, mainly for industrial uses. Early work was done by Clayton and Heffner, followed by the work of the Quartermaster Corps, and more recently followed by work at the Southern Utilization Research and Development Laboratories of the U. S. Department of Agriculture. Over the years there has been steady progress by the industry and by groups affiliated with or working with the industry, towards making textiles safer.

The point has been brought out that there has been progress in making cotton and other fabrics completely fire resistant; but the problem is far from being solved with complete satisfaction as far as fabric properties and cost are concerned.

One of the barriers to extensive use of flameproof fabrics is that consumers simply do not have enough interest in them or, perhaps, do not feel they can afford them. Ten or eleven billion yards of cotton fabrics are used in this country every year. If these were all flameproof, if the present finishes were entirely adequate from the standpoints of comfort, durability, attractiveness, etc., the consumers' bill for these fabrics would be approximately \$2 billion to \$5 billion more annually. I submit that consumers are not willing to pay that bill yet.

The cotton industry has worked very closely with fire protection people for many years. It cooperated in the development of the commercial standard which was designed to rule

out unusually combustible fabrics such as pyroxylin-coated goods and the materials used in the flammable cowboy chaps and "torch sweaters" previously referred to. Neither of the latter articles, incidentally, was made of cotton. The industry has continued to work to improve the Flammable Fabrics Act and continues to be interested in research on better fire-resistant finishes.

This problem by no means pertains only to cotton. Many synthetic fibers, when combined with other materials, will burn quite readily. For example, nylon doesn't burn easily by itself; but when it is combined with a completely fire-resistant fabric like one made of glass fiber, it burns readily. Wool is a very good fiber from the standpoint of fire resistance; but wool, like many of the synthetics, is not adaptable to the requirements of consumers for comfort, durability, economy, the passage of vapor, and for a good many other properties. These are the properties the public demands.

A comment about the professional textile finisher is in order. The finishing industry should be looked to for materials that will do a better job of flameproofing and that will be otherwise acceptable; but one should not be misled by a finisher who has an interest in pushing one or another finish. There is not now, in my opinion, a fully satisfactory fire-resistant finish for textiles, satisfactory from the standpoint of cost or performance.

A word should be said about the fanatic. For a good many years, the textile industry was faced with people who wanted to do good, but whose approach was entirely unreasonable and fanatical. They first wanted to rule out all textiles that burned. Then they wanted to put all kinds of unreasonable limits on burning time. They wanted to insist on fire-resistant treatments when there were none. They wanted to use fibers that were unsuitable and unacceptable to consumers.

It is gratifying to be able to report that since 1945, there has evolved a more reasonable attitude toward fabric flammability on the part of people interested in fire safety. I think the NFPA and its committees typify the better understanding that has pervaded this whole atmosphere in fire safety. It is very refreshing and will probably result in a great deal more progress through cooperation.

What can be done about the problem? The cotton textile industry is as concerned with this as anyone. We think that the educational approaches which have been discussed in NFPA are perhaps among the best. If people under-

stand that it is the normal property of almost all textiles to be combustible, if they understand that the materials they play with rather carelessly sometimes—matches, open fires, cigarettes, and so on—will cause serious injuries, perhaps the number of injuries and deaths can be reduced.

It is not fair to point the finger at textiles entirely. People have said, partly in jest, that if this were a different type of country, one where someone could dictate what is done, it might be wise to require that all textiles be

fire resistant. I submit that it would be just as reasonable to require that no flammable liquids be used. It would be more reasonable to require that people not smoke because smoking and the matches and lighters that are used in smoking cause a great many fires.

As we go ahead, let us keep this whole subject in perspective. Through education and through research on fire-resistant finishes, we can, if not solve the problem, make real progress toward reducing the number of wearing apparel fire casualties.

## VIEWPOINT OF THE WOOL INDUSTRY

Dr. H. J. Wollner, President

A. C. H. Fiber Service

I wear three hats. One hat associates me with wool. Another associates me with industrial consulting and a laboratory service for the textile industry here and in Europe. The third hat represents an intimate relationship and long background of experience in administering laws and regulations which are based upon data, tests and conclusions through research.

The wool hat which started out very large this morning has become smaller and smaller with the help of the information which has been submitted, for example, information in the report distributed by Mr. Babcock that wool is not too frequently found among the fibers worn by individuals who were involved in burning accidents.

It is neither pertinent nor helpful, neither progressive nor moralistic, to suggest that there are some fibers that are more dangerous as garments, more dangerous in tapestry form, more dangerous as carpets and coverings than other fibers. It would, however, be inconsistent with understanding to say that all fibers were the same. This document distributed by Mr. Babcock seems to indicate that wool apparently is less frequently involved in burn casualty cases than other fibers.

As an American citizen, I am quite concerned with getting people cogently, fervently, avidly interested in their own good. During ten years' service in the Treasury Department, I had intimate contact with law enforcement involving narcotics, alcohol, smuggling, and the like. I went away from this experience with a profound respect for the old adage that if you want a donkey to move from here to there, you need a stick and a carrot; and if you fail in having both the stick and the carrot, you have possibly lost control of your donkey.

In the administration of laws, it must be recognized that the mere statement of a truth, legally or by regulation, provides no assurance that the emotions of the individual will be sufficiently strong to keep him from being seduced by the competition between what he likes to wear and the fear of some damage which may come to him if he does wear it.

To be asked to advise industrial people what to do about the fabrication of a piece of material and the fibers which should go into it, and the kinds of claims they can make for it, causes one to pause and reflect on the problem. There always is the lady who wants to wear something flimsy—regardless of whether it is highly flammable—to make an impression.

I am convinced that the advancement of the idea that fire-safe wearing apparel is desirable must accompany any rule or regulation. The textile industry can be relied upon to move in the direction of the carrot, but the carrot must be an image in the eyes and minds of our people.

Of a dozen people with whom I discussed this meeting, none of whom had any technological background, all indicated that it would be distasteful to be limited in the kinds of fabrics or garments they could buy. Even though there was reason to expect that they were acquainted with the problem through experience, they were not responsive.

In summary, the problem confronting us today has nothing to do with the qualities and characteristics of wool, nor does it involve a choice of cotton, or nylon, or wool, or cashmere. The problem lies not so much with the flammability of textiles as with lack of public awareness of their flammability and lack of an instilled desire for protection against the hazard.

## DISCUSSION PERIOD

Mr. Witt Langstaff: Can fabrics be made with wool, all wool, for use in vertical draperies, which will pass the stringent NFPA test without chemical finishes?

Mr. Louis Segal: While wool is highly flame-resistant in its natural state, it is not quite resistant enough. It will ignite and burn very slowly and then go out by itself. From a strictly life-safety view, I would think wool is completely acceptable in this regard; but the standards have been set so that wool, while comparatively nonflammable, requires flame-retardant treatment.

Mr. Burruss B. McGuire: Mr. Buck, with regard to flameproofing cotton fibers, did you say there are roughly 10 billion yards of cotton fabrics sold annually and it would cost from \$2 million to \$5 million to make that flame retardant?

Mr. George S. Buck, Jr.: That is what I said. The cost of applying a fire-resistant finish may vary from a possible low of five cents a yard up to twenty cents a yard or more, depending on the type of finish, the weight of the material, and so forth. A kind of cost pyramiding goes on throughout the textile industry: the cost of the fabric is raised a certain amount by the converter, then raised a certain amount by the wholesaler, raised another amount by the retailer, and again raised by the garment manufacturer. So, by the time any unit cost in a fabric reaches the consumer, it is anywhere from three to five times what it was when applied to the fabric and even greater in some cases. Of course, there are other costs involved, such as the cost of channeling fire-resistant materials into the particular uses where a consumer might buy. The \$2 billion to \$5 billion figure is probably fairly conservative.

## VIEWPOINT OF THE AMERICAN ACADEMY OF PEDIATRICS

Dr. Robert H. Trimby

American Academy of Pediatrics

Mention should be made of studies made in Boston by our Poison Information Center, the lessons of which would very easily carry over to the burn problem. It was found that there were three categories of homes in which poisoning accidents were likely to occur: homes where the daily routine was interrupted by some unusual event, such as illness; homes where the development ages of the children were not anticipated by the parents (i.e., parents did not think child was able to reach stove); homes in which adequate safeguards were routinely disregarded.

One of the conclusions I have reached from my work in accident prevention is that we should think and plan for safety. We should try to establish safe habits. We should periodically eliminate the hazards around us. We should realize that worry and fatigue have an influence on behavior, and we should keep our minds on what we are doing.

The Accident Prevention Committee of the American Academy of Pediatrics was organized about 1945, when it became apparent that accidents were becoming the number-one cause of both morbidity and mortality in children. In 1955, the Accident Prevention Committee joined in a cooperative effort with the NFPA Wearing Apparel Committee to discover whether there was any correlation between burn injuries and the burning speed of textiles. The Accident Prevention Committee's part in the

joint investigation summarized by Mr. Babcock was the obtaining of the accident reports and samples of involved clothing.

People must realize that accidents are caused by carelessness and that only they themselves can prevent accidents.

I would like to commend to you the paper "Teaching Children Fire Prevention" by Dr. H. F. Dietrich, that has been distributed at this meeting. Dr. Dietrich was an early member of the Accident Prevention Committee and has done a considerable amount of work in this regard. I think that we would be in almost complete agreement with his educational approach to this particular problem.

I should like to quote from another article by Dr. Dietrich, which emphasizes the need for education. In a report presented to the American Academy of Pediatrics in 1956, Dr. Dietrich said, "The basic problem in childhood accident prevention is one of education involving physicians, parents, and children. The physician must learn more about the causes of accidents. He must perfect his techniques of teaching parents how to assume their role in accident prevention. The ultimate responsibility for juvenile accident prevention falls on the parent but must be conveyed in a nonfrightening manner and with a goal of achievement. This embraces a reciprocal relationship between profession and education related to age."

It is essential that parents recognize their

responsibilities for their children's education. The most stimulating educational device is participation. If parental example is good, then

instructions for the child will be effective. The Accident Prevention Committee is emphasizing the need for parental responsibility.

## VIEWPOINT OF CASUALTY INSURANCE COMPANIES

Charles S. Rust, Assistant Secretary, Safety Engineering Department

Aetna Casualty and Surety Company

There are a number of different types of casualty policies within the casualty insurance industry which provide protection for various phases of the textile flammability problem. For instance, product liability insurance is written for manufacturers, processors, distributors, wholesalers, retailers. A product liability policy protects those insured against claims brought by users of their products who claim, "Your particular product caused me bodily injury or property damage when I used it."

The casualty underwriter who must quote a rate to a particular manufacturer for the protection he wishes, bases his decision upon the claim dollars which have been paid out over the past five or six years on products of a similar nature. If the claim payments have been exceedingly high, then the rate for this particular manufacturer is going to be high because we have to charge a rate which will produce the premium dollars we expect to have to pay out in terms of claims.

Another form of liability policy which is sold to a different type of businessman is that of general liability. A general liability policy is sold to hospitals, hotels, apartment houses, theaters, owners of other kinds of real estate where members of the public congregate for various types of activities. Again, this policy is protecting the owner against claims brought for bodily injury while a member of the public is on his premises. Again, the underwriter is concerned with the claim experience in public buildings and whether or not there are conditions within the buildings which can contribute easily to the cause of fire, with the result of the public's being injured.

The engineering department within the casualty company is extremely interested in the fabric flammability problem from a somewhat different point of view than the underwriter. The underwriter is primarily interested in the dollars and cents he has to charge to pay anticipated claims. The engineer is interested not in the dollars, but in trying to minimize the accident-producing conditions in the buildings, in the case of general liability, or of the product, in the case of product liability. From past experience, it is known that the more the claim or accident cost can be reduced, the less the insurance rate will have to be—a direct benefit to the public. In the insurance business,

the dollar loss governs the cost the public will have to pay for whatever form of insurance is purchased.

Another type of casualty insurance is written in the form of individual accident, health, and hospitalization policies. In the group insurance field, there are group accident, group sickness, and hospitalization policies. Here again, the cost of these insurance programs is directly governed by what the cost of the claims may be.

There is no definite information within the casualty insurance industry as to dollar losses for burn cases of the type under discussion today. The statistical methods used in accumulating losses do not segregate burn claims. Losses are accumulated by types of business, in the case of product liability. In other words, a hardware manufacturer's losses go into one category; a sofa manufacturer's, into another. No attempt is made to find out how much of the cost is due to burns or to defective equipment.

However, it can be said that during the last ten years, there has not been any great difficulty as far as claims are concerned in the area of wearing apparel. That does not mean that the accidents and burns have not been occurring. It simply means from the method of accumulating statistics that there have not been many cases costing \$100,000, \$150,000 or \$200,000. Due to the absence of this type of claim, it has not been necessary to make radical adjustments in the rates. The story might be a little different if the individual burn claims could be segregated.

Nevertheless, the casualty insurance industry is concerned with the over-all economic aspect of the problem, realizing that if it cannot develop methods to control burn claims in the years to come, it will be confronted with an increasing number each year. For that very reason, the casualty insurance companies are trying to develop an educational program which will reach the groups which, to date, they have been unable to reach.

Those groups that can now be reached with an education program are the ones that are purchasing different types of casualty insurance policies. The manufacturers can be reached very well. Other segments of the public can be reached through education, primarily in the school systems where there is a



great deal of interest in the subject of liability. But there are still tremendous segments of the public that the casualty industry cannot put a finger on and which must be reached if the number of textile burn casualties is to be reduced.

It is generally felt by casualty insurance people that this reduction can only be accomplished by education, because from the limited information available, it appears that most of the causes of these fires are due to acts of human carelessness. Most of the textile

products today, be they sofas, clothing, or anything else, have built into them a reasonable degree of protection; and the manufacturer cannot go too much further in that direction.

That, in brief, is the casualty viewpoint on this matter. We feel that the time has now arrived where we should try with other groups, similar to the ones you represent here, to work out an over-all educational program to reach this large segment of people which, so far, has not been reached by individual efforts.

## October 2, 1962

### Afternoon Session

#### DISCUSSION PERIOD

Mr. Harry G. Kennedy: Has any consideration been given by insurance companies to the reduction of fire insurance rates in occupancies such as hospitals and sanitariums where all combustible fabrics, such as cubicle curtains, mattresses, and so forth, have been flameproofed?

Mr. Charles S. Rust: In building up the fire rates, the fire rating bureau may give credits or debits, depending on what materials are used in the building. Casualty insurance rates are not arrived at in the same manner. Rates in the casualty business are based on dollar claims paid, usually in the last three to four years.

Mr. Louis Segal: This question had an implication in it that I think is worth spending a moment on. The gentleman included flameproofing of mattresses and ticking. It is important to understand and be aware of the fact that merely flameproofing a mattress ticking or covering on overstuffed furniture is no guarantee of stopping a cigarette from doing the same amount of damage as would have been done had it not been flameproofed. Some types of flameproofing may be better than others but I do not think that flameproofing by itself will eliminate the cigarette problem. As a matter of fact, simple types of flameproofing will cause the cigarette to burn through the fabric more readily; so, sometimes flameproofing might make the situation worse than it was before.

Mr. George S. Buck, Jr.: Does Mr. Kennedy imply by his question that there are hospitals with cubicle curtains, blankets, mattress ticking, and so forth, flameproofed?

Mr. Harry G. Kennedy: Recent surveys indicate that many hospitals are thinking in this direc-

tion. Some of them are in the Midwest. One hospital in particular is noted to be a pioneer in this field. Their thinking is to protect everything from the interior mattress, which does not include the cotton batting which I believe Mr. Segal referred to, to the ticking, sheeting, blankets, spreads, and so forth. To date, however, there are not many hospitals that completely protect every item on the bed. Flame-retardant cubicle curtains are the predominant items at present.

Mr. George S. Buck, Jr.: Are hospital fires common occurrences? I should think that hospitals would be one place where, because of the presence of attendants, there would be no violations of smoking regulations.

Dr. Robert H. Kennedy: While I was serving in an Army hospital during the last war, it seems there was rarely a day when there was not a fire in one of the mattresses.

Chairman Morgan: Would it not be fair to say that smoking in bed in hospitals is a common practice?

Dr. Robert H. Kennedy: I fear it is, but the law in New York is that there shall be no smoking in any hospital.

Chairman Morgan: You can imagine how that would be breached.

Dr. Robert H. Kennedy: It would seem to be a foolish law to have.

Mr. George H. Moore, Jr.: In the last few years the majority of fires in VA hospitals involving patients were caused by smoking in bed. The second most frequent place of origin was day rooms where patients congregate and accidentally drop cigarettes. Unfortunately, older

patients sometimes cannot control their movements when they smoke and start fires when there are no employees nearby. This is particularly bad in ward toilets where fires are started by dropping cigarettes or flaming matches on pajamas or bathrobes while seated on the toilet.

A few years ago, the VA had a series of fires in oxygen tents. Since then, the use of oxygen tents and oxygen therapy has decreased because of change in treatment methods as well as the fire hazard.

The VA has increased the use of plastic mattress covers and conductive sheeting for better control. The former are used in ward areas to assist in the "wetter" and "soilers" problem, and the latter to assist in the flammable anesthesia problem.

The most significant point made today is the need for education. The VA hospital in Albany, where there are 1,000 beds, about four years ago, started to work on this smoking problem. They have gone to big badges—green badges for those who can smoke under certain control, red badges for those who cannot smoke under any condition, and yellow badges for others.

Mr. George S. Buck, Jr.: I think this is another case where we are perfectly willing to do all kinds of ridiculous things, like flame-proofing mattresses and pillows and sheets, but we never tell people not to smoke under dangerous circumstances; that just would not do; and that is the primary cause of the problem.

Mr. Harry G. Kennedy: I think this could be summed up in a conversation we had at a major Air Force base. The officer involved was completely unaware that durable flame-retardant fabrics were available. He told us that since July there were ten instances of men, possibly under the influence of liquor, who had ignited their beds after falling asleep while smoking. Here, again, it is a matter of education.

Our company has endeavored to educate hospital personnel and others as to the availability of processed fabrics. We have found from experience that generally they do not know that flame-retardant cottons exist.

Chairman Morgan: It is apparent that people in hospitals are going to do as they do at home; and until we are able to overcome their ignorance, educate if you prefer the word, we are going to have to face the consequences.

Mr. Harry G. Kennedy: Mr. Buck, has the National Cotton Council established any opinion as to necessary price and performance in order to further the use of flame-resistant fabrics?

Mr. George S. Buck, Jr.: We have done this in various ways and quite elaborately. We do this in many cases in the market for wash-wear

fabrics and for many types of special finishes and textiles.

I can say that there would be a large demand for fire-resistant finish if, first, it didn't cost anything and, second, it didn't change any of the properties of the fabric, such as comfort, absorbance, attractiveness, seam strength, ability to take dyes, and ability to be sewn. Starting from that point, as you add cost or as you detract from these useful properties, you begin to cut your market rather sharply. I would say that even with no additional cost or change of desirable properties, you would have to stimulate interest.

We feel that a finish would have to get into large consumer markets, would probably have to be sold at less than five cents a yard, or would have to be tied into something like the wash-wear finishes which offer the consumers a recognizable benefit. The public generally does not recognize the need for fire resistance. It does recognize freedom from wrinkles and easy care.

As Mr. Drake will tell you, we have long had an interest in these finishes. We encouraged his laboratory, which has been the leading laboratory in the world on fire-resistant finishes since World War II, to get into this field. The National Cotton Council does not sponsor a program at the moment because it thinks the U.S.D.A.'s program is so good.

In answer to your question, by itself, a fire-resistant finish would have to be below five cents a yard to be sold widely. The chances are better in combination with other properties recognized as being desirable.

Dr. H. J. Wollner: I would like to ask Mr. Rust a several-part question. Assuming that children's clothing manufacturers were interested in announcing the production of an authentic line of children's clothes that could be demonstrated to make children safer from fire than a line otherwise engineered, would insurance companies in the casualty field be receptive to the idea of issuing policies to the people who bought those for their children, presumably to be paid for as a merchandising venture by the manufacturer of the garments?

Mr. Charles S. Rust: I think what you are talking about is the so-called performance warranty, that is sold to some manufacturers now. One manufacturer of refrigerators has this type of insurance which guarantees the performance over a specified period of time. There is a similar type of insurance now provided to certain parts of the textile industry in the mothproofing area. I think my company is one of the very few that writes this type of insurance. What you are bringing up suggests a possibility for the future.

The warranty is against the damage of equipment and cost of replacement parts. The same is true of the mothproofing insurance. This is

warranty against a fabric's being eaten by moths after the fabric has been treated. Something along this line possibly could be worked out, applying to garments that have a permanent flameproofing treatment. But it is something that would have to be experimented with before any definite commitment could be made.

Dr. H. J. Wollner: Is there any interest at the present time by the insurance companies, in such material? Can we look forward to an exploration of the possibility of a warranty that a mother who buys a garment would understand that, in the event that her child suffered physical injury of one kind or another, there would be indemnity, not so much for the loss of clothing, but for the injury to the child? This would be selling safety.

Mr. George S. Buck, Jr.: I don't agree. How many people are you going to sell on the idea if their child burns, they can be indemnified? If you can say, your child won't burn, that is different.

A number of years ago, Macy's put out a great display of baseball shirts and other things and tried to promote these fire-resistant things in New York City, which is a good, big place with lots of consumers, but they had to dump them all in the end. I think they tried to burn them, but they wouldn't burn.

Dr. H. J. Wollner: I don't know as you are quite correct in painting the picture of Macy's difficulties. We are not talking of guaranteeing a piece of fabric. The basis for this insurance has been laid down over the years. Virtually all personal damage claims derive from these lines, so the novelty is not there. The novelty is in associating with a specific kind of consideration. What I am trying to advance is the recognition of the fact that, if you are to win people away from making a purchase which is ill-advised and poorly based, you must give them a positive value which they can recognize, to counterpoise against it.

Chairman Morgan: Is not the key to this problem recognition? Until people recognize there is a peril associated with their clothing, they are not likely to recognize it.

Dr. H. J. Wollner: This is the fallacy of our traffic accident picture today. People all know of the hazards of driving a car, but they don't see any good in reducing their casualness or lack of concern with ordinary safety procedures. If it had been left to the individual, there would be no safety glass on automobiles today in the United States. The automobile companies were not successful in merely selling safety glass. There had to be stimulation on the part of groups. Both recognition and stimulation are necessary.

Mr. George S. Buck: I believe there is a very

dangerous philosophy you are proposing here. One of the problems today is an implied warranty of safety when we sell conventional things. I don't know as it is justified but that is the basis of lawsuits you are faced with. There is an implied warranty and the cases brought against retailers and manufacturers are based on this implied warranty.

You are in a sense promoting another kind of warranty which is connected with the fire-resistant fabric. This immediately would make a very sharp distinction, I concede, between those which are fire-resistant and those which are normal. In the present state of the art, I don't think we are in any position to invite that type of distinction.

Chairman Morgan: Is it safe to say, Mr. Buck, that people who are damaged don't know anything about this implied warranty until they go to their lawyers?

Mr. George S. Buck, Jr.: I think that is probably true. Incidentally, I might say that I am sure the wool people might like this type of approach, but I don't say you are offering it from that standpoint.

Dr. H. J. Wollner: In my bias I am strictly objective, Mr. Buck. I assure you, however, that I have not excluded from my thinking the other fibers, with which I am familiar, and including cotton.

However, this whole question which I have just placed before Mr. Rust I pose, not as a panacea or a way to pursue; I just wish to suggest again that there must be something which is considered very desirable which is offered to the buyer to alert him to the broad patterns with which he is concerning himself or should be concerned. Spell it out in some different form and I think it will be equally satisfactory.

Dr. George M. Wheatley: I think Dr. Wollner has presented a very interesting idea. It seems to me that parents already have this carrot concept built in with respect to the welfare of their children. I think our job is to make them better informed about how garments can be made safer. If they have a choice of buying something which is safer, I think the public generally can be persuaded in this direction although it takes time. The progress that is beginning to be made with regard to the use of seat belts is an example.

When the public begins to look for the less flammable material because it is believed to be more desirable, we have the carrot idea. I don't believe that a parent would buy something because, as Mr. Buck says, you are going to be reimbursed if your child is hurt. I think you want to know whether your child has reasonable safety in the wearing of some particular garment.